Revised Booster Study Plan
Based on DOE Review Committee's Recommendations
July 24, 2003
(For discussion)

1. Dogleg:
- The L3 dogleg will be repositioned during the shutdown. Its effect is to be expected to reduce by 80%. (Lackey)
- The L13 dogleg will also be repositioned when the new septum is made. (Lackey, Harding)
- Other machines (KEK Booster, BNL AGS Booster, CERN PS Booster) are studying this problem.

2. Chromaticity modeling:
- Recalibrate SEXTL and find +5% difference from the original value. (Glass)
- Recalibrate SEXTS under way (Glass, Lackey)
- Sextupole eddy current effect negligible (Ostiguy)
- Main magnet field dc measurement complete (DiMarco, Schlabach)
- Main magnet field ac measurement under way (DiMarco, Schlabach)
- Re-measure ac chromaticity (Tomlin, Chou, Dooling)
- Re-fit body sextupoles (Drozhdin)
- Chromaticity spreadsheet (Ostiguy)

3. Power supply experiments at the E4R:
- 12 Hz operation successfully tested but rejected (Wolff, Lentz, Vogel)
- Dual-harmonic operation:
  - ➢ Simulation and specs done (Wolff)

- ➢ 2nd harmonic choke design under way (Kashikhin, Mills)
- ➢ 2nd harmonic capacitors to be purchased (Wolff)
- ➢ Test to be planned (Wolff, Lentz)

4. Space charge study:
  - ▪ Simulations:
    - ➢ 1-D ESME (Lucas, MacLachlan)
    - ➢ 2-1/2-D ORBIT
      - ▪ Greatly improved version by adding in mxyzptlk/beamline C++ class libraries, MAD parser, python shell, etc. (Ostiguy, Michelotti)
      - ▪ New version undergoing extensive test (Chou, Lucas)
      - ▪ Modified MAD lattice file (Drozhdin)
    - ➢ 3-D Synergia (Spentzouris, Amundson)
      - ▪ In addition to emittance growth, can simulate tune footprint and halo generation
      - ▪ Up to 5M particles on a 65×65×65 grid
  - ▪ Space charge reduction:
    - ➢ Painting expt. (Tomlin, Chou)
    - ➢ Inductive inserts expt. (Wildman, Chou, Dooling)
    - ➢ IPM upgrade (Zagel)
    - ➢ Quadrupole pickup (Jansson?)

5. Lattice model improvement and measurement:
  - ▪ Trim quads (Huang, Drozhdin)
  - ▪ Steering dipoles (Huang, Drozhdin)
  - ▪ Alignment errors (Ohnuma)
  - ▪ Aperture limit (Prebys, Lackey)
  - ▪ Beta-function measurement (Huang)

6. Transition crossing:

- Previous studies (MacLachlan, Lucas, Ankenbrandt)
- Gamma-t jump lattice modeling (Chou)
- New 1-D simulations:
    - ESME *vs.* 1-D ORBIT (Lucas, Ostiguy)
    - With and w/o gamma-t jump (Lucas)
- Hardware test and beam experiment (Pellico)

7. Impedance and instabilities:

- Magnet impedance measurement (Crisp)
- Space charge impedance in two parallel plates (Lucas, Ng, Chou)
- RF cavity HOM modes (Wildman)
- Slow head-tail instability
    - Observation (Tomlin)
    - Analysis (Ng)
- Coupled bunch instability
    - Observation (Tomlin, Pellico, Koba)
    - Analysis (Ng)
    - Longitudinal damper (Wildman)
    - RF frequency modulation for Landau damping (Griffin, Zotter, Reid)